

What is claimed is:

1. A high frequency circuit module,  
wherein RF circuit parts are mounted on both  
sides of a multilayer dielectric substrate, and  
5 transmission lines connecting said RF circuit  
parts on both sides are constructed by a group of vias  
having a periodical structure or vias having a coaxial  
structure extended in the direction perpendicular to  
the face of said multilayer dielectric substrate.  
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2. The high frequency circuit module according to  
claim 1, wherein said via group having the periodical  
structure is constructed so that a plurality of vias  
are distributed around a center conductor at an  
15 interval which is equal to or smaller than  $1/4$  of  
wavelength of a signal of said transmission line.
3. The high frequency circuit module according to  
claim 1, wherein said via having the coaxial structure  
20 is formed by a center conductor and a cylindrical  
conductor surrounding said center conductor and  
connected to a grounding conductive layer provided in  
said multilayer dielectric substrate.
- 25 4. The high frequency circuit module according to  
claim 1, wherein a high frequency circuit part provided  
on one of the faces of said multilayer dielectric  
substrate is an antenna.

5. The high frequency circuit module according to claim 1, wherein said multilayer dielectric substrate includes three or more dielectric substrate layers, a microstrip transmission line of a millimeter wave circuit part is formed by a pattern of a surface metallic layer of a first layer and a metallic layer provided between the first and second layers, and a metallic layer formed in another intermediate layer in said dielectric substrate has a transmission line to which an intermediate frequency signal generated by said millimeter wave circuit part is connected.

6. The high frequency circuit module according to claim 5, comprising a both-sided two-layered dielectric substrate in which a final layer on the side opposite to the first layer of said multilayer dielectric substrate is larger than the other plurality of dielectric substrates of said multilayer dielectric substrate,

wherein a metallic layer of an antenna pattern is formed on one of the faces of the final layer, and

a support plate is formed in the portion where said other dielectric substrates are not stacked on the other face of said final layer.

7. The high frequency circuit module according to claim 1, wherein said multilayer dielectric substrate

is provided with a grounding metallic layer as a layer lower than a grounding metallic layer used as a counter electrode of the microstrip line made by the surface metallic layer as a millimeter wave transmission line, and a metallic layer for transmitting an intermediate frequency signal and a metallic layer for a millimeter wave circuit power providing line to avoid crosstalk of a millimeter wave signal in the surface layer are provided between said grounding metallic layers.

8. The high frequency circuit module according to claim 5, wherein said multilayer dielectric substrate is constructed so that the lines for intermediate frequency signal and the high frequency signal are disposed between said grounding metallic layers and do not cross a sealing portion of said multilayer dielectric substrate with said hermetic cap.

9. The high frequency circuit module according to claim 8, wherein said plurality of other dielectric substrates are a multilayer substrate made of glass ceramic or alumina ceramic, and said both-sided two-layer dielectric substrate is a both-sided two-layer substrate made of teflon whose permittivity is lower than permittivity of said plurality of other dielectric substrates, and said support plate is any of a metal plate, a metal plate in which holes are opened to increase a heat dissipating efficiency, a hard organic

substrate, a hard organic substrate in which holes are opened, and a hard organic substrate in which holes are opened and which is metal plated to increase thermal conductivity.

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10. An automotive radar module,

wherein an antenna metallic pattern is formed on one of faces of a multilayer dielectric substrate,

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RF circuit parts including an oscillation circuit, a power amplifier for amplifying a part of an output of said oscillation circuit and supplying the amplified output to said antenna, and a mixer for mixing a signal from said antenna metallic pattern with a signal of the oscillation circuit are formed on the other face of

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said multilayer dielectric substrate, and

a transmission line for connecting said antenna metallic pattern and said RF circuit parts is constructed by a group of vias including a periodical structure or vias having a coaxial structure provided in the direction perpendicular to faces of said multilayer dielectric substrate.

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11. The automotive radar module according to claim 10, wherein the group of vias including said periodical structure is constructed so that the vias are distributed around a center conductor at an interval which is equal to or smaller than  $1/4$  of a wavelength of a signal of said transmission line.

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12. The automotive radar module according to claim 10,  
wherein said via having the coaxial structure is formed  
by a center conductor and a cylindrical conductor

5 surrounding said center conductor and connected between  
grounding conductive layers provided in said multilayer  
dielectric substrate.

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